## DISCUSSION.

## By A. J. HENRY.

Mr. George Reeder's observations at Columbia, Mo., reported upon in Monthly Weather Review for October, 1919, associate a movement of cirrus from some easterly point, with high temperature and drought in Missouri and other parts of the great interior valleys. In a letter from Mr. Reeder, dated June 21, 1921, he reports, in part, as follows: "For about two weeks and more, the atmosphere at the cirrus level has been in a very stagnant condition, as observed at the Columbia station. Finally cirrus clouds were observed moving from easterly points on the 11th, 15th, 17th, and 18th, and from the south on the 20th and 21st. \* \* \*

"The surface conditions of the past 10 days have not furnished any connections apparent or reasons why the upper part of the troposphere should flow back upon itself."

In order to get as much light as possible upon the subject the aid of the Aerological Division was sought. Through the courtesy of that division the table presented below has been prepared. This table summarizes by dates all cases of the upper air currents observed moving from an easterly quarter at and above 5 km. The general impression created by a study of the data of this table is that in general interruptions to the general drift of the air at higher levels from west to east are at best local and temporary. There seems to be but little uni-

formity in the direction of the upper winds from the east at stations moderately close to each other except in the single case of June 19 over southern Michigan, southern Wisconsin, and northern Indiana—see the records of Lansing, Madison, and Royal Center. Even in this case the depth of the northeast layer was not uniform at the three stations, being greatest at Lansing and least at Royal Center; at Madison, moreover, a north-northwest wind was observed above the north-northeast wind.

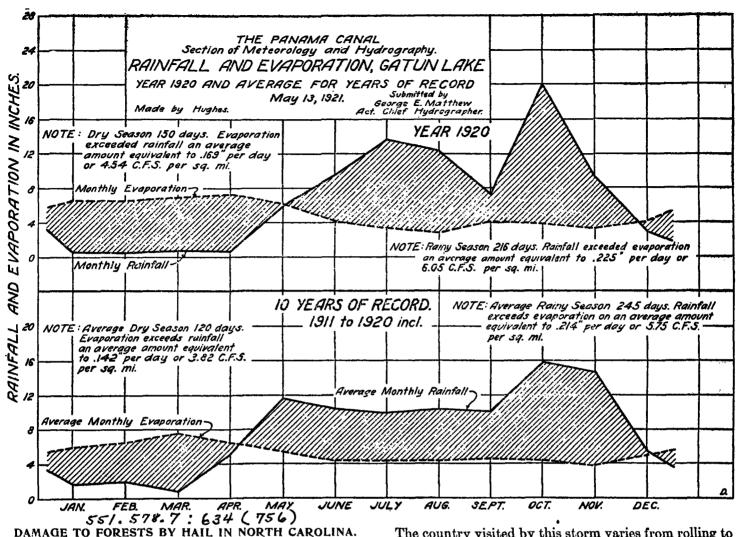
The daily weather maps for the dates on which winds from an easterly quarter were observed give little or no indication of the cause of the movement from that direction, although it seems probable that the direction observed at Broken Arrow, Okla., on the 11th, 12th, and 13th was due to the movement of an anticyclone across the State on those dates. At this same station on the 17th strong southeast winds were observed at 10 km. which may have been caused by a large anticyclone which occupied the Gulf States.

Mr. W. R. Gregg, in charge of the Aerological Division, is of the opinion that the matter of cirrus movement from the east is simply a question of latitudinal temperature distribution. If the gradient is steep, then westerly winds of high speed are found aloft; in proportion to the decrease in the latitudinal temperature gradient there is found a decrease in speed of the westerlies. If that gradient becomes nil or is reversed the westerlies cease and sometimes easterlies are found.

Table 1.—Air movements from easterly directions above 5 km. at kite and balloon stations, June 10-30, 1921.

Date, 1921.	Time (75th Mer. T.).	Station.	Surface.		5,000		6,000		7,000		8,000		9,000		10,000		11,000		12,000		13,000		14,000	
			Dir.	Vel., m. p. s.	Dir.	Vel., m. p. s.	Dir.	Vel., m. p. s.	Dir.	Vel., m. p. s.	Dir.	Vel., m. p. s.	Dir.	Vel., m. p. s.	Dir.	Vel.	Dir.	Vel., m. p. s.		Vel., m. p. s.	Dir.	Vel., m. p. s.	Dir.	Vel., In. p. s.
June 10 11 12 13 14 15 16 17 18 18 19 20 21	3:44 p. 3:12 p. 6:54 a. 8:13 a. 7:46 a. 2:45 p. 7:48 a. 2:48 p. 2:48 p. 3:33 p. 7:49 a. 8:08 a. 8:20 a. 8:20 a. 3:30 p.	Nue West, S. C. Key West, Fla. March Field, Calif Broken Arrow, Okla. Denver, Colo Key West, Fla. Broken Arrow, Okla do Camp Knox, Ky. Due West, S. C. Key West, Fla. Camp Benning, Ga do Camp Benning, Ga Camp Benning, Ga Due West, S. C. Broken Arrow, Okla Camp Benning, Ga Due West, S. C. Broken Arrow, Okla Camp Benning, Mich. Madiscn, Wis. Royal Center, Ind. Camp Bragg, N. C. do Arcadia, Calif. Camp Hragg, N. C.	sse. w. nne. ese. wnw. wnw. e. ssw. nw. wnw. sw. e. nne. se.	356455445355425565343224545	nne. e. ese. ne. sse. ne. ese. sse. ne. ese. ss. ssw. w. ssw. ese. n. nne. ese.	3 6 8 10 5 4 13 9 7 7 4 4 2 2 3 5 6 7 4 2 2 5 5 7 5 6 4 4 4 4	ene. ne. s. nnc. e. sse. n. e. ene. ese. sse. s. sw. wsw. s. enc. nne.	4 5 6 5 12 10 3 7 2 2 2 4 7 9 4 4 5 5 7 7 9 1 1 1 5 7	88W. W. Se. e.	7 6 66 13 5 5 4 4 66 10 9 3 2 2 5 6 9	ase.	7 5	se. se. n.	8 2 2 8 20 6 2 4 6	se. ese.	3 13 21 9 3 20	se. se. se.		sw. se.	1	Se. 30.	12 10	ere.	13
22 23 24 25	4:14 p. 4:25 p. 7:43 a. 7:46 a. 3:22 p.	Camp Brass, N. C. March Field, Cehf. Key West, Fla. Fort Omnia, Nebr March Field, Calif. Camp Bennins, Ga Key West, Fla. do. Camp Bennins, Ga Due West, S. C. Key West, Fla. do.	wnw sc. n. nw. w. ssw. se. wnw pe.	3 7 4 1 2	wnw. ne. ssc. wsw. ene. ene. sse. e.	3 3 6 8 1 6 11 3 1 5	se. nw. sw. s. ene. ssw. ssw. ssw. ssw. ssw. ssw. ese. ene.	9 3 3 2 2 6 3 5 6 5	ssw.	6 4 5	sse.	9 3 14 5 6 8		7 4 3 8 7			nnw.	5			: :			

<sup>1</sup> Mo. WEATHER REV., Dec. 1919, 47: 853-851.



By J. S. Holmes, State Forester, North Carolina Geological and Economic Survey.

[Raleigh, N. C., June 30, 1921.]

On Thursday afternoon, April 28, a very heavy storm swept across northern Anson County, N. C. Hail fell over a strip extending at least 4 miles east and west, from Ansonville east to Mr. Bennett Nelme's plantation and half a mile wide. The duration of the hailstorm was said to be about three quarters of an hour, but the heaviest lasted only about 15 minutes.

The direction of the storm seemed to be from the northeast as windows on those two sides were broken, and the old paint on those sides of buildings was marked by the large hailstones. It was at the eastern limit of the storm and toward the center of the strip that the worst damage seems to have been done and the heaviest hailstones fell. At Ansonville, according to reliable witnesses, the stones were "from the size of partridge eggs to that of hen eggs," while at the Nelme plantation they were said to be as large as baseballs. Gardens were demolished, many roofs were broken up, and the grain fields destroyed throughout the belt.

Fruit trees, peach and pecan, were almost fatally injured, only the upright branches being sufficiently sound to profitably leave in the orchard. The other branches have very many places where several square inches of bark was knocked off. Few limbs which had more than 3-inch spaces uninjured were seen, when the State forester visited the area six weeks after the storm.

The country visited by this storm varies from rolling to almost level. Probably two-thirds of it is in cultivation and the other third is chiefly second-growth pine, lob-lolly, short-leaf and long-leaf pines mixed, but mostly loblolly. Some areas had been cut within a couple of years, leaving the smaller trees standing. On one area there were a number of old-growth long-leaf pine trees with the second growth loblolly all around. The damage to the forest seems to have been greater along the middle of the strip, gradually diminishing toward each side. In the belt of greatest damage perhaps half a mile wide and a mile long, the pines have probably less than 10 per cent of the foliage left, most of it having been beaten off, together with the twigs. The ground is still littered with twigs, needles, and cones. So far, there seems to have been no attempt on the part of the trees to put forth new shoots, but probably there has not been time enough for that. Some of the trees have already been attacked by the pine-bark beetle and there seems little power of resistance, as scarcely any gum is secreted where the insects bored into the bark. The chances are that a much smaller number of beetles to each tree will be necessary to kill them. Much pine reproduction, even second or third year seedlings, was killed by the hail, the stems often being badly bruised.

It seems certain that the owner has acted wisely in selling for immediate lumbering the merchantable timber on some 40 acres of the worst damaged forest, although he had planned to hold this for future use and further growth.